Site 300 is an oasis for a rare native plant

LLNL's wild side

By Lisa Paterson

If you visit Site 300 at this time of year, it's not difficult to find big tarplant *(Blepharizonia plumosa)* blooming along roadsides and in other "disturbed areas," such as areas graded for roadways or designated for prescribed burns. Big tarplant thrives in the harsh arid Site 300 environment.

Although fairly common at Site 300, big tarplant is an extremely rare plant included in the "California Native Plant Society's Inventory of Rare and Endangered Plants of California." Big tarplant may be limited to as few as three general areas outside of Site 300. Its range includes Alameda, Contra Costa, San Joaquin, Stanislaus and Solano counties, where it is found in dry grasslands at elevations less than 1,650 feet.

Late summer may seem like a strange time of the year to be discussing rare plants: temperatures are near 100 degrees, the hills are brown with dried grasses and Livermore Valley residents are starting to long for the first fall rains. But amazingly, big tarplant is one of many California native plants that have adapted to bloom in the hottest and driest part of the year. Big tarplant is a fall flowering annual plant. Similar to the rest of the native annual flora, its seeds germinate in the fall and winter with the first rains of the season. However, unlike the more widely known spring flowering annuals, big tarplant remains relatively inconspicuous until the very end of the summer when it blossoms and sets seeds just before the fall rains start the cycle again.

STEVE GREGORY

Big tar plant (left) blooms late in the year in September and October when most Site 300 plant life is dried and dormant. It easily grows along the roadsides at Site 300

Big tarplant lives on moisture that remains in the soil after the spring flowering plants have dried and withered. It's hard to believe there is any water left in that dry, hard soil in August, but surprisingly there is. It is the same moisture that some of our noxious late-season weeds survive on, such as yellow star thistle.

Big tarplant has developed many strategies to survive in the conditions that exist at and around Site 300. This species is a member of the sunflower family (*Asteraceae*). As is common in many members of the sunflower family, tiny glands on the stems and leaves of big tarplant, give it a distinctive smell. The resin produced by these glands helps to deter herbivores such as insects and deer. Its inner seeds have tiny feather-like appendages, called pappus, which give each seed the appearance of a tiny helicopter and help them to disperse in the wind. The small hairy leaves of the big tarplant help to limit the amount of water it loses through evaporation.

Research conducted by LLNL's Environmental Protection Department indicates that the annual prescribed burns conducted at Site 300 play a role in the abundance of this rare species at the site. Big tarplant grows in large numbers in areas that are routinely burned at Site 300. This is unusual because at the time of the annual spring burns, the plant is a small green seedling, and thus very susceptible to fire damage. Although fire is fatal to individual big tarplants directly in its path, fire may provide the disturbance necessary to reduce competition with other plant species (such as exotic annual grasses) and allow larger groups of big tarplant to be established.

It is possible that the larger Site 300 big tarplant population is acting as a group of smaller populations that are mostly isolated. Seeds are occasionally exchanged between the small populations so that if one is completely destroyed by fire it can be repopulated by seeds from another. This group of small populations is referred to as a metapopulation. Smaller groups of big tarplant may establish or disappear, depending on fire uniformity and intensity, but the metapopulation is sustained.

Although historic occurrences of big tarplant have been lost as a result of residential development and competition with non-native plants, it is perfectly adapted to the hot, dry, windy grasslands of the Altamont Hills and the cycle of wildfire that are a natural part of this environment (see the Aug. 20 Wild Side). Research continues at LLNL to determine how disturbance (prescribed burns, road grading) affects big tarplant. It is hoped that this research will help determine the management practices necessary to promote healthy populations of big tarplant both at Site 300 and throughout its historic range.